NUEXCO

AUGUST 1984 NUMBER 192

MONTHLY REPORT

ON THE NUCLEAR FUEL MARKET

NUEXCO

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET

August 1984 No. 192

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PRICING
Natural Uranium and Conversion 1
Secondary Market Enrichment Services 1

CURRENT MARKET DATA
Nuexco Market Data Table 2
Prices Expressed in Selected Currencies 3
Recent Transactions 5
Supply and Demand Tables 7

ESSAY
The Changing Role of Brokers 12

RECENT DEVELOPMENTS
Australia 14
South Africa 14

RAW MATERIALS
The Palabora Project 15

HISTORICAL MARKET DATA
Graph of Exchange Value and Transaction Value 22
Historical Exchange Value, Transaction Value and Conversion Value ... 23

GOVERNMENT STATISTICS
Australia and Canada 24
South Africa and United States 25

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To Our Readers

Nuexco will host a hospitality suite during the Uranium Institute's Ninth Annual Symposium in London, England. The suite will be located at the Savoy Hotel, September 5–7. We look forward to seeing you there.

* * *

We are pleased to announce that **Mr. Clark M. Beyer** has joined Nuexco to assist Wes Miller with the production of the Monthly Report. Clark is a recent graduate of Stanford University.

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NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of July 31, 1984 is **$17.50** per pound U_3O_8, unchanged since last month. The *Current Market Data* section of this Report lists six uranium sales transactions, involving a total of approximately 1.3 million pounds U_3O_8 *equivalent*. Three of those transactions were sales of enriched UF_6, two involved concentrates, and one involved natural UF_6.

Active supply of uranium (U_3O_8 and UF_6) for spot and near-term delivery totals **2.9 million** pounds U_3O_8 or equivalent UF_6, down 1.4 million pounds since last month. The corresponding figure for **active demand** is **940 thousand** pounds, down 960 thousand pounds. The spot and near-term **supply-demand ratio** rose to **3.1:1.**

The **Transaction Value** as of July 31, 1984 is **$16.60** per pound U_3O_8, up $0.10 since last month. The current Transaction Value includes 10 transactions involving a total of 3.9 million pounds U_3O_8 or equivalent UF_6 and covers a period of 4 months.

The **Loan Use Charge Rate** as of July 31, 1984 is **6 percent** per annum, unchanged since last month. No uranium loans are reported.

* * *

The Exchange Value is unchanged at $17.50, primarily because of the continued presence in the market of sellers prepared to offer material at or near that level in order to conclude transactions for near-term delivery and payment. Of the active sellers, several are non-US, and are motivated by the current strength of the US dollar compared to other currencies. Reflecting a seasonal phenomenon, the pace of market activity has slowed recently, and fewer bids and offers are being transmitted.

The drop in near-term uranium supply during recent months can be attributed to the reluctance of most US producers to offer at current market prices, as well as to the completion of a substantial volume of inventory selling. This month's drop in demand is due partly to one large buyer's having begun final negotiations toward a contract. Any upward price movement must await the activation of buyers having actual requirements, as opposed to discretionary buyers motivated only by bargain prices.

* * *

The **Conversion Value** remains **$0.00** per pound U in UF_6, due primarily to the continued absence of active demand for conversion services. In addition, some holders of U_3O_8 can swap for natural UF_6, at no cost, with natural uranium sellers wishing to deconvert their material. Active supply of conversion services for delivery within three years amounts to 2.8 million pounds U in UF_6. No secondary market conversion transactions are reported.

SECONDARY MARKET ENRICHMENT SERVICES

The secondary market **SWU Values** as of July 31, 1984 are **$95** for **DOE origin** and FY85 delivery, unchanged, and **$85** for **non-DOE origin** and delivery within approximately 15 months, an increase of $5. The *Current Market Data* section of this Report lists thirteen secondary market SWU sales, involving approximately 3.2 million SWUs. Four of those transactions were assignments of DOE origin SWUs. Active near-term SWU supply amounts to 510 thousand SWUs, while active demand amounts to 335 thousand SWUs.

The DOE origin SWU Value is unchanged at $95 because the remaining active sellers continue to offer substantial discounts to interested buyers. Most buyers seek relatively small quantities of SWUs to fill requirements for the coming fiscal year, but many are hesitating to act until they make final long-term enrichment contracting decisions. The non-DOE SWU Value is up $5, possibly reflecting the beginning of a shift in market dominance from secondary market sellers to non-DOE primary suppliers.

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CURRENT MARKET DATA

July 31, 1984	Market Values	Active Supply[1] (thousands)	Active Demand[1] (thousands)
EXCHANGE VALUE	**$17.50**/ lb. U_3O_8	2,900	940
CONVERSION VALUE	**$0.00**/ lb. U in UF_6	2,825	0
SWU VALUES			
DOE origin, FY85 delivery	**$95**/ SWU	510	335
non-DOE origin, delivery within 15 months	**$85**/ SWU		
LOAN USE CHARGE RATE	**6%**/ annum	7,050	0

TRANSACTION VALUE	$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
	16.60	3.9	10	4

[1]Supply and demand tables in the *Current Market Data* section of this Report detail the numbers for each category. Quantities of SWUs (Separative Work Units) are not referenced to a particular origin.

DEFINITIONS

1. The **Exchange Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.
2. The **Conversion Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.
3. The **SWU Values** represent Nuexco's judgment of the price at which transactions for the sale of significant quantities of SWUs of stated origin for delivery in the specified time period could be concluded as of the date indicated.
4. The **Loan Use Charge Rate** is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.
5. The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
   a. Transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
   b. At least ten transactions;
   c. Transactions involving a sum total of at least 2 million pounds U_3O_8 equivalent.

   The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

DERIVATIONS AND COMMENTS

1. All Market Values are based on:
   a. Data from recently completed transactions.
   b. Data from pending transactions.
   c. Firm bids to buy or borrow, and firm offers to sell or lend.
   d. Prices purchasers or rates borrowers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy or borrow, and prices sellers or rates lenders have expressed a willingness to offer, but for which Nuexco is not aware of firm offers to sell or lend.
2. Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not considered in the determination of these Market Values.
3. In the determination of the Conversion Value, Nuexco does not consider transportation charges other than those customarily provided by primary suppliers of conversion services.
4. The prices of conversion services or SWUs delivered under long-term contracts with primary suppliers are not considered in the determination of either the Conversion Value or SWU Value.
5. For the SWU Values, Nuexco converts SWU prices at varying tails and product assays to equivalent SWU prices at the DOE Reference Transaction Tails Assay (presently 0.20 weight-percent U_{235}) and a product assay of 3.0 weight-percent U_{235}, assuming feed costs corresponding to Nuexco's Exchange and Conversion Values determined as of the same date.
6. In calculating the Transaction Value, Nuexco does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminant variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)
Australia (dollar)	21.08	20.21	27.27	54.81	52.55	70.89
Belgium (comm. franc)	1,023	992.06	1,263	2,661	2,579	3,284
Canada (dollar)	23.01	23.03	29.57	59.82	59.87	76.89
Finland (markka)	106.58	103.24	134.83	277.08	268.41	350.53
France (franc)	155.42	149.57	189.72	404.05	388.86	493.24
FRG (mark)	50.64	48.71	63.19	131.64	126.62	164.28
Italy (lira)	31,117	30,027	37,383	80,896	78,065	97,188
Japan (yen)	4,304	4,152	5,780	11,189	10,794	15,028
Netherlands (guilder)	57.23	54.88	70.44	148.78	142.67	183.14
South Africa (rand)	28.62	23.68	26.37	74.40	61.56	68.57
Spain (peseta)	2,861	2,766	3,582	7,439	7,191	9,313
Sweden (krona)	146.81	143.09	185.04	381.68	372.00	481.07
Switzerland (franc)	43.08	40.75	50.92	112.00	105.93	132.39
UK (pound)	13.37	12.94	15.72	34.77	33.65	40.86
US (dollar)	17.50	17.50	24.00	45.50	45.50	62.39

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)
Australia (dollar)	20.00	19.06	26.70	52.00	49.55	69.42
Belgium (comm. franc)	970.76	935.37	1,237	2,524	2,432	3,216
Canada (dollar)	21.82	21.71	28.96	56.74	56.45	75.29
Finland (markka)	101.10	97.35	132.02	262.83	253.08	343.23
France (franc)	147.42	141.03	185.77	383.27	366.64	482.96
FRG (mark)	48.03	45.92	61.87	124.87	119.39	160.86
Italy (lira)	29,516	28,312	36,604	76,736	73,604	95,163
Japan (yen)	4,083	3,915	5,660	10,614	10,177	14,715
Netherlands (guilder)	54.28	51.74	68.98	141.13	134.51	179.32
South Africa (rand)	27.15	22.33	25.82	70.57	58.05	67.14
Spain (peseta)	2,714	2,608	3,507	7,056	6,780	9,119
Sweden (krona)	139.26	134.91	181.19	362.05	350.75	471.05
Switzerland (franc)	40.87	38.42	49.86	106.24	99.88	129.63
UK (pound)	12.69	12.20	15.39	32.98	31.73	40.01
US (dollar)	16.60	16.50	23.50	43.16	42.90	61.09

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on July 31, 1984.

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CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6			per kg. U as UF_6		
	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)	This Month (July 31, 1984)	Last Month (June 30, 1984)	12 Months Ago (July 31, 1983)
Australia (dollar)	0.00	0.00	1.25	0.00	0.00	2.76
Belgium (comm. franc)	0.00	0.00	57.89	0.00	0.00	127.64
Canada (dollar)	0.00	0.00	1.36	0.00	0.00	2.99
Finland (markka)	0.00	0.00	6.18	0.00	0.00	13.62
France (franc)	0.00	0.00	8.70	0.00	0.00	19.17
FRG (mark)	0.00	0.00	2.90	0.00	0.00	6.39
Italy (lira)	0.00	0.00	1,713	0.00	0.00	3,777
Japan (yen)	0.00	0.00	264.93	0.00	0.00	584.08
Netherlands (guilder)	0.00	0.00	3.23	0.00	0.00	7.12
South Africa (rand)	0.00	0.00	1.21	0.00	0.00	2.66
Spain (peseta)	0.00	0.00	164.18	0.00	0.00	361.95
Sweden (krona)	0.00	0.00	8.48	0.00	0.00	18.70
Switzerland (franc)	0.00	0.00	2.33	0.00	0.00	5.15
UK (pound)	0.00	0.00	0.72	0.00	0.00	1.59
US (dollar)	0.00	0.00	1.10	0.00	0.00	2.43

SWU VALUES EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	DOE SWU FY85 (July 31, 1984)	DOE SWU FY85 (June 30, 1984)	Non-DOE SWU delivery within 15 months (July 31, 1984)	Non-DOE SWU delivery within 15 months (June 30, 1984)
Australia (dollar)	114.46	109.74	102.41	92.41
Belgium (comm. franc)	5,556	5,385	4,971	4,535
Canada (dollar)	124.90	125.02	111.75	105.28
Finland (markka)	578.56	560.47	517.66	471.98
France (franc)	843.69	811.97	754.88	683.76
FRG (mark)	274.88	264.40	245.95	222.66
Italy (lira)	168,919	163,006	151,138	137,268
Japan (yen)	23,364	22,539	20,905	18,980
Netherlands (guilder)	310.66	297.90	277.96	250.86
South Africa (rand)	155.36	128.55	139.00	108.25
Spain (peseta)	15,533	15,015	13,898	12,644
Sweden (krona)	796.98	776.78	713.09	654.13
Switzerland (franc)	233.87	221.19	209.26	186.26
UK (pound)	72.60	70.27	64.96	59.17
US (dollar)	95.00	95.00	85.00	80.00

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on July 31, 1984.

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RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
3069	1984	101-300	unknown	European Producer	European Broker	
3067A	1984	101-300	indeterminate	European Entity	US Fabricator	Enriched UF_6.
3059A	1984	less than 50	indeterminate	US Fabricator	European Utility	High-enriched UF_6.
3057	1985	50-100	102	US Fabricator	US Utility	Natural UF_6.
3003	1984	301-600	95-105	Canadian Producer	US Utility	
2972C	1985	301-600	96	European Entity	European Utility	Enriched UF_6. Assumes $80 per SWU and 0.20 tails assay. Buyer exercised option.

Continued on next page.

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CURRENT MARKET DATA

RECENT TRANSACTIONS[1] *(continued)*

Secondary Market Enrichment Services

Nuexco Transaction Number	Delivery Period[2]	Approximate Quantity[3] (thousands of SWUs)	Approximate Price[4] as Percent of Current SWU Value[5]	Seller Group	Buyer Group	SWU Origin	Remarks
3072	1987-90	101-300	unknown	European Entity	European Entity	Eurodif	
3071	1985-86	601-1,000	unknown	European Entity	US Utility	DOE	
3070	1984	less than 50	104	European Entity	US Fabricator	Eurodif	
3068	1987-90	101-300	see remarks	European Entity	US Utility	Eurodif	Fixed annual prices.
3067B	1984	50-100	104	European Entity	US Fabricator	Eurodif	Enriched UF_6.
3062	1985	50-100	105	European Utility	US Utility	DOE	
3061	1985	less than 50	109-111	US Utility	US Utility	DOE	
3059B	1984	less than 50	indeterminate	US Fabricator	European Utility	unknown	High-enriched UF_6.
3058	1985	101-300	94	European Utility	US Utility	DOE	
3050	1987-91	101-300	see remarks	European Entity	Non-US Utility	Eurodif	Fixed prices, subject to ceiling.
3048	1987	101-300	114	European Entity	US Utility	Eurodif	
3045	1987-90	601-1,000	unknown	European Entity	European Entity	Eurodif	
2972D	1985	less than 50	93	European Entity	European Utility	Eurodif	Enriched UF_6. Buyer exercised option.

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.
[2]Refers to calendar year, not fiscal year.
[3]For sales of enriched UF_6, if tails assay was not designated, Nuexco's calculation of SWU quantity assumes 0.20 w. o tails assay.
[4]Price is not normalized to 0.20% tails assay.
[5]Refers to SWU Value for same origin as SWUs included in transaction.

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URANIUM SUPPLY
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
1575	—	500 per year	
1818	—	500 per year	1985-90
2201	95	—	
2236	—	200 per year	1985-89
2263	—	500 per year	1985-90
2275	145	—	
2288*	45	—	UF_6
2315*	—	1,000	1987-90
2336	—	250 per year	
2368	—	2,800	
2392	35	—	UF_6
2429*	450	—	
2484	130	—	
2489	—	500	1986-90
2509	1,200	1,600	UF_6
2521	50	100	U_3O_8 or UF_6
2556	350	—	UF_6
2565	400	—	
TOTAL:	2,900		
INACTIVE			
0564	—	1,000 per year	1985-90
2191	125	—	UF_6
2193	—	800 per year	1986-90
2271	—	500 per year	1984-88
2297*	—	200 per year	1985-89
2326	—	3,500	1988-91
2389*	300	—	
2473	—	500 per year	1984-90
2495	130	—	UF_6
2514	—	1,000 per year	
2553	300	—	
TOTAL:	855		

*New or revised since last month.

[1]Measured from the date of this Report.

[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

Projects removed since last month: 2134, 2390, 2436A, 2505.

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CURRENT MARKET DATA

URANIUM DEMAND
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long term	Remarks
Inquiries to Purchase:			
ACTIVE			
2217	—	1,000 per year	1988-95
2329	—	500	1985
2352	240	—	
2456	650	—	UF_6
2506	50	—	U_3O_8 or UF_6
2528*	—	250 per year	1991 on
TOTAL:	940		
INACTIVE			
1999	—	50 per year	1985-90
2244	—	350 per year	
2414	—	150 per year	1987-91
2442	—	250 per year	1986 on
2457	—	650	1987
2507	—	300	1987-88
2542A	1,400	—	enriched UF_6
2555*	—	200 per year	1986-89
TOTAL:	1,400		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2355A, 2372, 2413, 2419, 2494, 2558, 2566.

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LOAN SUPPLY
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1938	2,000	—	UF_6
2128	2,500	—	
2139	2,000	—	
2483	550	—	
TOTAL:	7,050		

Projects removed since last month: 2453.

CONVERSION SUPPLY AND DEMAND
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale:			
ACTIVE			
2141	2,600	—	
2511	225	—	
TOTAL:	2,825		
INACTIVE			
2051	1,000	—	
2401	600	—	
2438*	500	250	1985-87
2511*	600	700	1986-90
TOTAL:	2,700		
Inquiries to Purchase:			
INACTIVE			
2420	300	—	1986
TOTAL:	300		

*New or revised since last month.
[1]Measured from the date of this Report.

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CURRENT MARKET DATA

SWU SUPPLY
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
2100	—	100 per year	1986-87
2164*	80	—	
2285*	—	1,000	
2351*	—	150	1986-88
2408*	50	60	1986
2428*	100	50	
2510*	200	—	
2513*	25	25	1986
2550*	55	—	
TOTAL:	510		
INACTIVE			
2192*	10	—	
2345	150	—	
TOTAL:	160		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2436B, 2469.

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SWU DEMAND
(As of 7/31/84)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2407*	35	35	1986
2430*	100	—	
2443*	75	—	
2452	30	—	1985
2480*	50	—	
2503	—	330	1986
2519	—	30 per year	1987 on
2522	20	—	
2543*	10	20	1986
2562*	15	30	1986
TOTAL:	335		
INACTIVE			
2346*	—	300	1987-89
2449	50	—	
2454	75	75	1986
2459	50	50 per year	
2471	60	40 per year	
2479	—	50	1986
2512	—	15 per year	1987 on
2542B	340	—	enriched UF_6
2552	35	—	
TOTAL:	610		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2237, 2355B, 2432A, 2432B, 2518, 2544, 2546, 2550, 2567.

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ESSAY

THE CHANGING ROLE OF BROKERS

Introduction

During the past four to six years, many nuclear fuel market participants have faced particularly difficult inventory and supply problems. In many cases, brokers have helped solve these problems by facilitating the redistribution of goods and services through such means as secondary market sales, other transactions between unfamiliar parties, or deals that an individual fuel manager might be precluded from executing.

During the mid to late 1970s, when prices generally were on an upward trend, as little as 10 percent of the goods and services that changed hands involved brokers. By contrast, Nuexco's review of nuclear fuel market transactions closed in 1983 indicated that transactions involving brokers accounted for approximately 30 percent by monetary value, and 20–50 percent by volume, of the total goods and services exchanged (excluding primary market sales of conversion and enrichment services) (Table 1). Those percentages do not in any way imply trends or permanent relationships, but rather are useful to indicate the extent of brokers' current involvement in nuclear fuel transactions. Corresponding figures for the year ended June 30, 1984 indicate a brokers' participation of approximately 35 percent, both by volume and by monetary value.

Table 1

BROKER PARTICIPATION IN 1983 NUCLEAR FUEL MARKET TRANSACTIONS

Material/Service	Percent of Total Volume Brokered
natural uranium concentrates	20
natural UF_6	40
secondary market conversion services	50
secondary market enrichment services	50

Brokers' Services

Brokerage services have become particularly useful during the past few years as the number of near-term uranium sales and secondary market sales of conversion and enrichment has increased, and the market has become truly international. In the broadest sense, the broker's business is to improve the market's efficiency by expediting the movement of resources from where they are less needed to where they are more needed. To do so, the broker brings buyers and sellers together and helps parties find solutions to problems encountered during negotiations.

The broker's basic services are to identify opportunities to clients, to assist clients in structuring and transmitting bids, offers, and inquiries, and to perform other customary services necessary for the conclusion of transactions. Bids and counter-bids are submitted on behalf of buyers, while offers and counter-offers are submitted on behalf of sellers. The procedures and terminology associated with these conventional market tools are reviewed in Report 188 (April 1984), in the essay entitled *Bids, Offers and Inquiries*.

Through a comprehensive communications network, a broker may have contact with virtually all competitive market participants on both the buy and sell sides of the market. Those contacts can be highly advantageous in that they provide a perspective on competitive bids or offers that is often unavailable to the individual buyer or seller. The broker's contacts make available to the client a wider range of market opportunities than the client alone may be aware of. For example, a broker may know of unique opportunities, such as companies wanting to buy or sell on a one-time basis. Through its position as a knowledgeable intermediary, the broker may be able to structure complex transactions involving several parties, deals that an individual market participant may be precluded from executing.

One particularly valuable service that a broker may render is the protection of a client's identity. To do this, the broker can submit to other market participants anonymous bids, offers or inquiries on behalf of the client. The client may have various reasons for wishing to remain anonymous. For example, in order to meet a scheduled delivery obligation, a producer may choose to purchase uranium rather than produce it—a decision having important competitive implications. By using a broker, a buyer or seller also can make a bid or offer incorporating new prices, terms, conditions, or ideas, without a commitment to reveal its identity unless the bid or offer is accepted. Or, the buyer or seller might use an anonymous inquiry to ascertain whether such new terms would be acceptable.

A related technique is the simultaneous inquiry, a proposal designed for simultaneous evaluation by a selected

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buyer and seller. Typically, a broker would submit such a proposal to a buyer and a seller that, based on the broker's prior knowledge of their interests and individual situations, appeared to be a suitable match. The principal advantage of the simultaneous inquiry is that the broker initiates the contact. Thus, neither the buyer nor the seller needs to reveal its identity or expose its negotiating posture, and either can legitimately disclaim authorship of the proposal.

A company choosing to liquidate materials and obligations associated with U_3O_8, conversion services, UF_6, enrichment services, enriched uranium, or fabricated fuel might be accustomed primarily to purchasing activities. If so, it can obtain valuable assistance from a broker in the formulation and execution of effective sales strategies. Because a company's inventory carrying charges alone may amount to several million dollars per year, the economic advantages of more efficient fuel arrangements can be enormous.

Compensation

As the complexity of the nuclear fuel market has increased over the past few years, brokerage organizations have become more versatile. In the past, it was generally possible to distinguish among three types of full-time or part-time brokers:

1. Those employed by individual buyers or sellers as consultants or agents;
2. Those that performed a non-partisan role, seeking to match various opportunities on both sides of the market and to structure transactions;
3. Those that bought and sold uranium and related services for their own accounts (traders or dealers).

In recent years the distinctions among these types of brokerage organizations have become blurred. The primary brokers in the nuclear fuel market may now engage, to some extent, in any or all three of those types of brokerage activities. As a result, the means by which an individual broker earns compensation may vary widely with the particulars of a transaction or client relationship.

If the broker has an exclusive client relationship such as that of a consultant, compensation is likely to be based on a fixed rate or charge paid regardless of the quantity traded or the dollar value of the transaction. If the exclusive relationship involves marketing by the broker, compensation may take the form of a fixed percentage of the price obtained.

In the majority of transactions in the current market, brokers do not have exclusive relationships with clients, but rather have bi-partisan relationships with both the buyer and the seller. Normally broker fees are a specified and agreed-upon amount per pound U_3O_8, per KgU, or per SWU (thus removing the broker from any interest in the price level of the business). Sellers generally pay fees, unless there is a strong seller's market (more buyers than sellers, more demand than supply, and upward pressure on prices), such as that which existed from the mid to late 1970s. The determination of which party pays the broker's fee in a balanced market was once thought to be the subject of considerable negotiation, but in recent years the fee has come to be accepted as a selling expense.

As an alternate means of obtaining compensation, the broker may take a middle position in a transaction, buying from one party and selling to another, earning a fee on the spread between purchase price and sale price. Such a transaction is customarily called a back-to-back transaction, because the broker takes title to the commodity only momentarily, in a brief intermediate step that involves no risk. A back-to-back transaction may be nothing more than a device for the principal parties in the transaction to pay a brokerage fee without issuing explicit payment instructions. In that case, neither buyer nor seller needs to record (or report) a payment for brokerage services.

If a broker retains title to material prior to arranging its resale, thereby assuming a risk, the broker may be considered a dealer, but the implications of such a role are not always clear. A broker may take title to material for the limited purpose of facilitating a complex transaction between other parties, rather than to become a true dealer, trading for his own risk and account. However, compensation for a dealer always comes from the difference between the buying price and the selling price. The amount of compensation can be large or small, even negative, depending on the results the dealer achieves.

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RECENT DEVELOPMENTS

AUSTRALIA

At its biennial federal convention July 9–13, the ruling Australian Labor Party (ALP) essentially affirmed the uranium policy it established tentatively in November 1983. The policy allows Ranger and Nabarlek to continue U_3O_8 production and export, but prohibits mining of any undeveloped uranium properties except for the Olympic Dam copper-uranium deposit. It also forbids exports of Australian uranium to France as long as the French military performs nuclear weapons tests in the South Pacific. As an added note, the final policy prohibits nuclear power plants or any fuel cycle facilities from being built in Australia.

There had been indications during the months preceding the ALP convention that the Party would liberalize the uranium policy. Senior ministers in the government stated that the policy lessens Australia's ability to influence international nuclear issues, and harms relations with important European trading partners. The Australian Science and Technology Council (ASTEC) completed a report on May 31 supporting the ministers' point of view, advocating a more active role for the nation in the nuclear fuel cycle. At the ALP convention, the reasoning of the senior ministers and scientists encountered the customary emotional opposition.

In 1983, Australia produced a total of 8.4 million pounds U_3O_8, ranking it seventh among the seven uranium-producing nations of the free world that produced more than 3 million pounds. While expansion of the Ranger project and the mining of Olympic Dam could add substantially to annual capacity in the future, the restrictive commercial conditions imposed by the government have by now relegated Australia to a position of secondary importance in the uranium market.

SOUTH AFRICA

Second quarter production from Chamber of Mines producers amounted to 3.79 million pounds U_3O_8, down slightly from the level of 3.85 million pounds produced in the first quarter of the year (Table 2). Significant declines occurred at JMS (down 25.6 percent), Harmony (down 15.7 percent), and Chemwes (down 10.0 percent), but were largely offset by production increases at Randfontein (up 25.9 percent) and Vaal Reefs (up 5.6 percent). The changes in output from individual facilities represent normal variations in tons treated, so the expected 1984 output from Chamber of Mines producers remains unchanged at approximately 15.5 million pounds U_3O_8.

Table 2

**REPUBLIC OF SOUTH AFRICA:
SECOND QUARTER 1984
URANIUM PRODUCTION[1]
(Thousands of pounds U_3O_8)**

Operation	First Quarter 1984	Second Quarter 1984	Year to Date
Beisa (St. Helena)[2]	338	333	671
Blyvooruitzicht	155	132	287
Buffelsfontein	313	331	644
Chemwes (Stilfontein)	310	279	589
Dreifontein Consolidated	98	104	202
ERGO[3]	113	94	207
Harmony	307	259	566
Hartebeestfontein	248	253	501
JMS[4]	356	265	621
Randfontein	287	361	648
Vaal Reefs	1,069	1,129	2,198
Western Areas	175	171	346
Western Deep Levels	79	82	161
TOTAL	3,848	3,793	7,641

[1]Excludes Palabora Mining Company, which is not a member of the Chamber of Mines.
[2]Uranium production scheduled to end by November 31, 1984.
[3]ERGO = East Rand Gold and Uranium Co. Ltd.
[4]JMS = Free State Joint Metallurgical Scheme.

AMPLIFICATION

Commercial Fuel Cycle Facilities in Japan

Last month's Report (Number 191, page 21) discussed a proposal by the Federation of Electric Power Companies (FEPC) to build commercial-scale enrichment, reprocessing, and waste storage facilities at a site in northern Honshu. The first sentence of the article incorrectly implies that the waste storage facility will hold spent fuel (high-level waste). In actuality, the storage facility will be designed to hold up to 3 million drums (600,000 m^3) of low-level waste. The reprocessing plant, scheduled to have a capacity of 800 metric tons per year, will have an initial capacity to store 3,000 tons of spent fuel. The FEPC has established a budget of approximately 1 trillion yen (more than $4 billion) for the three-facility project.

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THE PALABORA PROJECT

Introduction

The Palabora project in the Republic of South Africa is one of the highest volume open-pit mines in the world, with over 100 million metric tons (tonnes) of ore and waste removed annually. Copper is the principal product recovered, along with four by-product minerals including uranium. In 1983 Palabora produced 218.6 tonnes U_3O_8 (482,000 pounds) from 29 million tonnes of ore sent to the mill. Uranium production in South Africa currently is limited to the Palabora mine and to the Witwatersrand gold district.

Palabora Mining Company Ltd. (Palabora) operates the project, which is located in the Letaba district, Northeastern Transvaal Lowveld (Figure 1). Formed in 1956, Palabora originally was a joint venture including Rio Tinto Zinc Ltd. of London (now RTZ) and Newmont Mining Corporation of New York; the two companies' interests currently amount to 38.9 and 28.6 percent, respectively. Palabora dedicated the early years of the project to evaluation of the main ore deposit as a source of copper. Actual mining began in 1964; by the end of 1983, 1.2 billion tonnes of ore and waste had been mined.

History of Discovery

The Palabora ore deposit is implaced in a carbonatite and foskorite host rock that forms the core of the much larger Palabora Igneous Complex (Figure 2). The carbonatite core proved more resistant to erosion than surrounding rocks, thus forming a prominent hill, Loolekop, that became a landmark to early travelers through the region. Copper mineralization was reported on Loolekop around 1870 by the first European settlers. They described strong showings of copper mineralization throughout the highland area, plus evidence of primitive excavations where ancient people mined the ore and recovered the copper in small clay smelting pots. Archaeologists estimate that the early mining began some 1200 years ago and continued until the late 1800s.

In 1912, Dr. Hans Merensky initiated the first detailed geologic assessment of the Palabora Igneous Complex. He noted the presence of large reserves of vermiculite and phosphate (apatite) minerals in addition to copper. A small company, South African Phosphate Ltd., started mining phosphates in 1932 in a valley below Loolekoop, but the operation failed financially after extraction of some 4500 tonnes. In 1939 Merensky formed the Transvaal Ore Company for the purpose of exploiting the known vermiculite occurrence. The Phosphate Development Corporation (Foskor) began large-volume mining of phosphates in the early 1950s; Palabora began mining copper in the following decade. Presently, three open-pit mines are operating within the complex: Palabora's main copper mine, Palabora's vermiculite mine, and Foskor's phosphate mine (Figure 2).

Exploration Activity

Members of the geological unit of the South African Atomic Energy Board established the presence of uranothorianite in association with the copper mineralization in 1952. The Mineral Development Section of the Atomic Energy Board evaluated the economic potential of uranium during the period 1953–1956. After considerable surface drilling and underground exploration drifting, the uranium content of the deposit was demonstrated to be well below economic levels for recovery, and attention shifted back to the potential value of copper.

Palabora gained control of a key portion of the carbonatite core zone at the time the joint venture was formed in 1956, and detailed evaluation of the copper potential began late that year. The exploration team drilled 111 inclined holes from the surface at an average length of 370 meters, a total of 41,000 meters. Over 7,000 meters of horizontal drilling was completed in association with underground exploration drifting. The underground work enabled geologists to determine the continuity of the mineralization and to collect a bulk sample of ore for metallurgical testing. Three inclined core holes encountered almost continuous copper mineralization to a vertical depth of 1,000 meters.

Drilling results indicated the presence of an estimated 286 million tonnes of copper ore averaging 0.68 percent. Several other minerals occur within the copper-bearing zone, including extremely low-grade uranium.

Geology

Geologists believe that the Palabora Igneous Complex intruded sequentially into Archean granite during the Precambrian period. Overall, the complex influenced an area about 8 kilometers in a north-south direction and 3 kilometers east-west. There are 14 different rock types associated with the complex, of which the youngest intrusion is the transgressive carbonatite core that constitutes a major part of the Palabora ore deposit. The carbonatite core has been age-dated at approximately 2060 million years. It is estimated that the sequence of intrusions was

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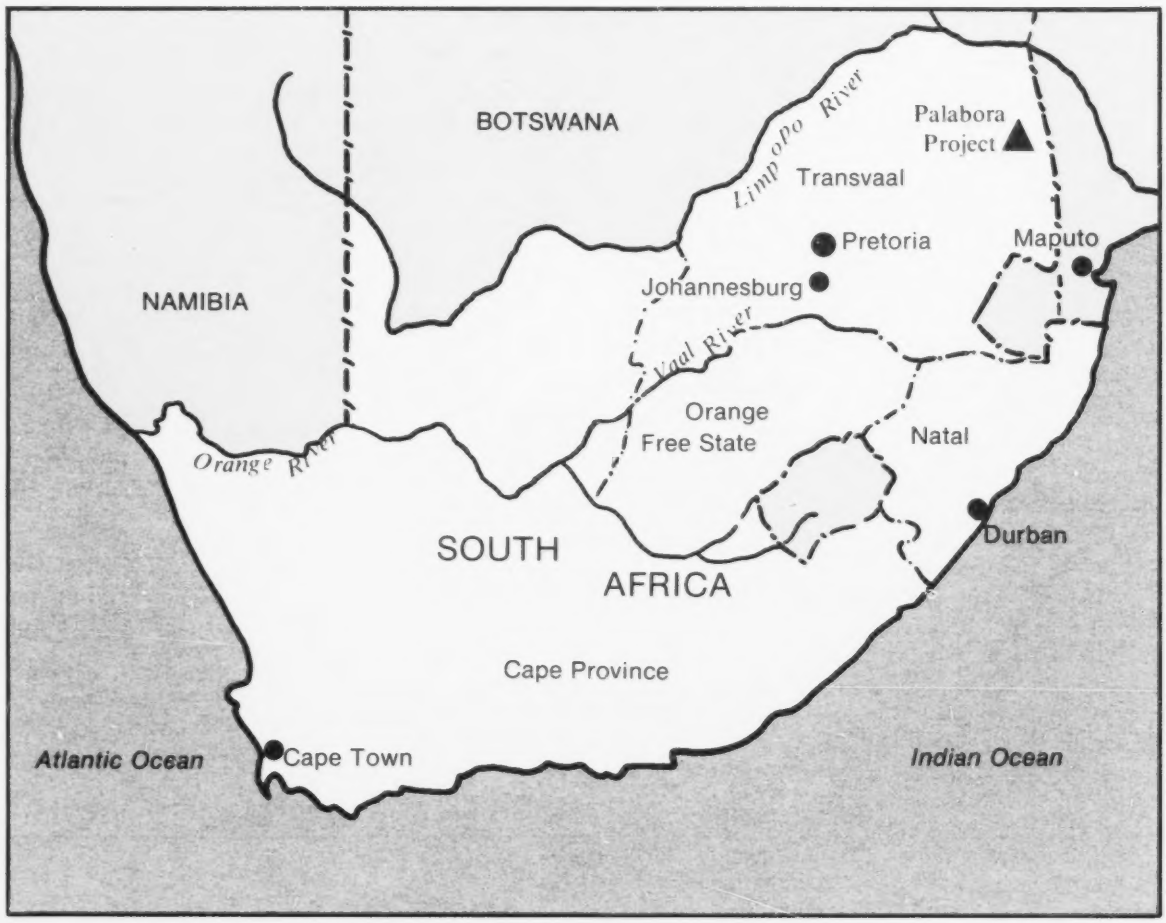
Figure 1

LOCATION OF PALABORA PROJECT, REPUBLIC OF SOUTH AFRICA



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somewhat continuous, so the earlier intrusions are considered only slightly older than the core.

The intrusions contain a series of rock-forming minerals high in magnesium, iron, sodium, phosphate and carbonate. The transgressive carbonatite core intruded into a banded carbonatite segment; the younger rock is distinguished by lighter color, finer grain, lack of foliation and banding, and high content of copper sulfides and accessory minerals. Both the transgressive and the banded carbonatite intrusions consist primarily of calcite and dolomite. The carbonatite intrusions are surrounded in turn by a vertical volcanic pipe of foskorite, a rock composed of olivine/serpentine, magnetite, apatite and phlogopite.

It is clear from the position of the transgressive carbonatite core that the younger rock sequences of the Palabora Igneous Complex intruded in mass or as radiating dike swarms along lines of weakness developed during each preceding intrusion. The position of the transgressive core is controlled by two pre-existing fracture systems at the center of the banded carbonatite. The system containing the main mass trends about N 85 degrees E; the other system is about N 65 degrees W, and includes a series of carbonatite dikes extending three to four hundred meters along the trend. The placement of the Palabora ore deposit was definitely controlled by the two strong fracture patterns.

Mineralization

The mineralization in the main ore deposit is believed to be of epigenetic origin. Following the intrusion of the transgressive carbonatite, the core cooled and intense fracturing ensued. The fracturing provided access subsequently for migrating fluids, and led to deposition of minerals in rich veinlets. Generally the veins are less than two centimeters wide and are continuous for up to one meter both horizontally and vertically.

The banded carbonatite and foskorite contain widely scattered grains of copper sulfide mineralization (mostly bornite). Since it occurs as discreet grains disseminated throughout the rock, it is considered syngenetic. The copper mineral content decreases from the core into the older rocks. However, essentially all banded carbonite and a substantial portion of foskorite are mined and processed as copper ore.

The principal ore minerals at Palabora are chalcopyrite and bornite, both copper sulfides. Three other copper sulfide minerals are present in minor amounts and contribute to the total copper recovered. In addition, twelve other sulfides of copper, nickel and iron are present in minor to trace amounts. Gold, silver, platinum and palladium also occur in trace amounts. Those minerals are recovered from the final sludge generated in the electrolytic refining process, while nickel sulfate is recovered from the tankhouse electrolyte.

The source of uranium at Palabora is the mineral uranothorianite $(U\ Th)O_2$, which contains approximately 45 percent U and 43 percent Th. Uranothorianite occurs in small amounts in close association with copper sulfide mineralization.

Project Development

Following several years of property evaluation, Palabora determined that recovery of copper by large-volume open-pit mining would be economical, and that recovery of at least four by-product minerals would improve project economics substantially. The company launched the project on that basis in July 1963. Prior to mine development, Palabora acquired part of the Foskor property in order to accommodate long-range mine schedules for expansion of the pit. At the same time, the company assumed full control of the vermiculite mining operation from Transvaal Ore Company. The main development eventually would require an open pit approximately 2000 meters wide having a depth of 805 meters below the crest of Loolekop. Figure 3 is an idealized vertical cross-section through the pit.

Mine development and construction of processing facilities began in 1964. The initial plant design capacity involved crushing 30,000 tonnes of ore per day to produce 73,000 tonnes of anode and blister copper annually. In the first full year of production, 1966, over 10.9 million tonnes or ore were milled. Annual tonnages mined and milled have increased steadily since then. In 1969, Palabora increased the milling rate to 52,000 tonnes ore daily, and in 1976, further expansion increased the milling capacity to 80,000 tonnes ore per day, thereby increasing anode copper production to approximately 125,000 tonnes annually. The daily mining rate for ore and waste since 1980 has averaged almost 330,000 tonnes, including one 24-hour period when a record 521,000 tonnes were loaded and hauled from the pit.

Original projections of the project's life extended through 1992. In August 1979, following extensive engineering studies, Palabora announced plans to enlarge the open pit in all dimensions to further the life of the project by five years, to 1997. Approximately 625,000 tonnes of copper will be produced during the extended period, and the recovery of by-product minerals will continue at about the same rate.

The company built a pilot plant on site in 1967 to con-

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RAW MATERIALS

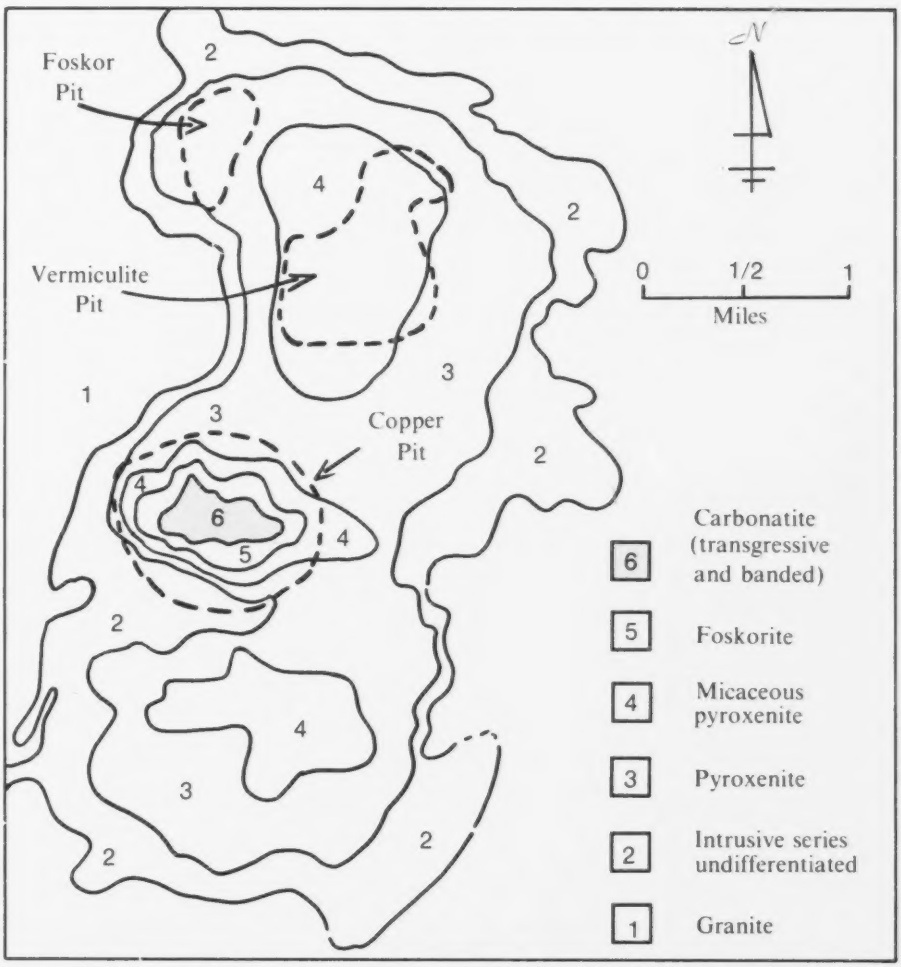

Figure 2. Generalized geologic map of Palabora Igneous Complex, showing location of three operating mines. (Map adapted from Van Der Spuy, 1982.)

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centrate the heavy-mineral fraction of the ore. The plant provided the bulk concentrate samples required to finalize chemical extraction procedures for all heavy minerals. Once procedures were finalized, the company built a gravity concentration plant large enough to process the tailings from the copper plant (about 25,000 tonnes per day), primarily to recover uranium and zirconium.

Commercial-scale recovery of uranium began in 1971. In that year, Palabora recovered approximately 61 tonnes of uranium concentrates (135,000 pounds) from 19 million tonnes of ore. Uranium recovery increased annually to over 500,000 pounds in 1981 and has remained near that level through the first half of 1984. Production may increase to more than 600,000 pounds U_3O_8 annually as a result of the current expansion program. Figure 4 shows a recent aerial view of the Palabora open pit and ore processing facilities.

Ore Processing

Ore from the pit goes through three-stage crushing to reduce grain size to minus ¾-inch. Water is added as the ore moves to the rod and ball mill grinding circuit for reduction to a fine powder. Pumps send the fine-ground slurry through a cyclone; the overflow goes to the flotation circuit and the underflow gravitates back to the grinding circuit for recycling.

Approximately 80,000 tonnes fine-ground ore per day enters eight banks of continuous flotation cells. Chemical reagents are mixed with the slurry from the grinding circuit to be aerated and mechanically agitated. The copper minerals become attached to air bubbles and float to the surface to be skimmed off, forming a copper concentrate of 36 percent. The heavy mineral fraction is in the residue and leaves the flotation circuit as tailings. About 62,000 tonnes per day move on to magnetic separators where magnetite is recovered as the first by-product.

The non-magnetic tailings, some 35,000 tonnes per day, are moved to the heavy minerals plant for uranium and zirconium recovery. A gravity separation process employing Reichert cones separates both minerals from the tailings stream. Following separation in the Reichert cones, the heavy-mineral concentrate moves on to shaker tables, where further concentration and separation of the uranium and zirconium occurs. The high-phosphate portion of the tailings stream is pumped to the Foskor plant for recovery of phosphate values.

The uranium content of the feed to the Reichert cones averages about 0.0035 percent U_3O_8, while the concentration of the feed entering the shaker tables is approximately 0.2 percent U_3O_8. It exits the shaker tables in concentrations up to 5.0 percent U_3O_8 and 14.0 percent ThO_2. Approximately 25 tonnes of uranothorianite concentrate are produced daily.

Uranothorianite concentrate is added to an agitated leach vat containing a 60-percent nitric acid solution preheated to 75 degrees Celsius. An exothermic reaction increases the temperature to 100 degrees during the leach time of 45 minutes per batch. The leach pulp is filtered, and the uranium-charged liquor is transferred to the continuous solvent extraction circuit.

The uranium liquor contains traces of thorium, copper and lead as it enters the six-stage counter-current mixer unit. An organic solvent consisting of 10 percent tributyl phosphate is added. After a 25-minute contact time, the loaded organic is scrubbed with a 12-percent bleed-off of OK liquor to remove all traces of foreign material. The scrubbed organic is then stripped in an eight-stage circuit using a nitric acid solution heated to 40 degrees Celsius. The product is OK liquor containing 30 to 50 grams U_3O_8 per liter.

Precipitation of uranium concentrates occurs in two stages. In the first stage, the pH of the OK liquor is increased from 1.0 to 3.7 by bubbling ammonia gas through it for almost seven hours. The second stage includes the addition of more ammonia, raising the pH to 7.5 to complete precipitation of ammonium diuranate (ADU). The ADU slurry is thickened and filtered on a rotary-drum vacuum filter. The filter cake is repulped and sent to a calcining furnace, where it is prepared for packaging. The final product accounts for approximately 50 percent of the uranium contained in the heavy-mineral fraction of the tailings stream that enters the gravity concentration circuit.

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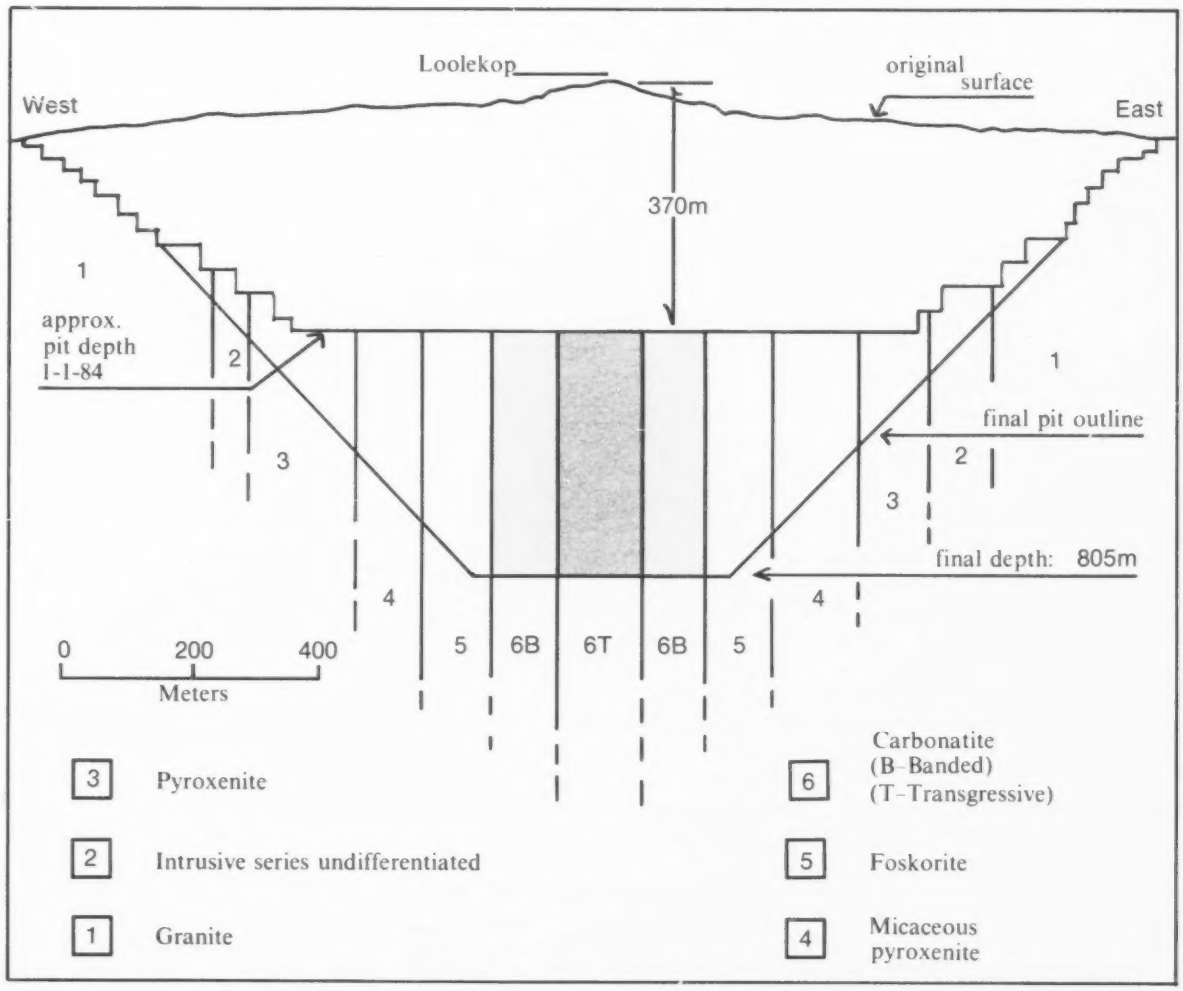

Figure 3. Idealized East-West vertical section through the Palabora open pit, illustrating mine plan in relation to intrusive rock sequence.

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Figure 4. Aerial view of open pit and processing plant.

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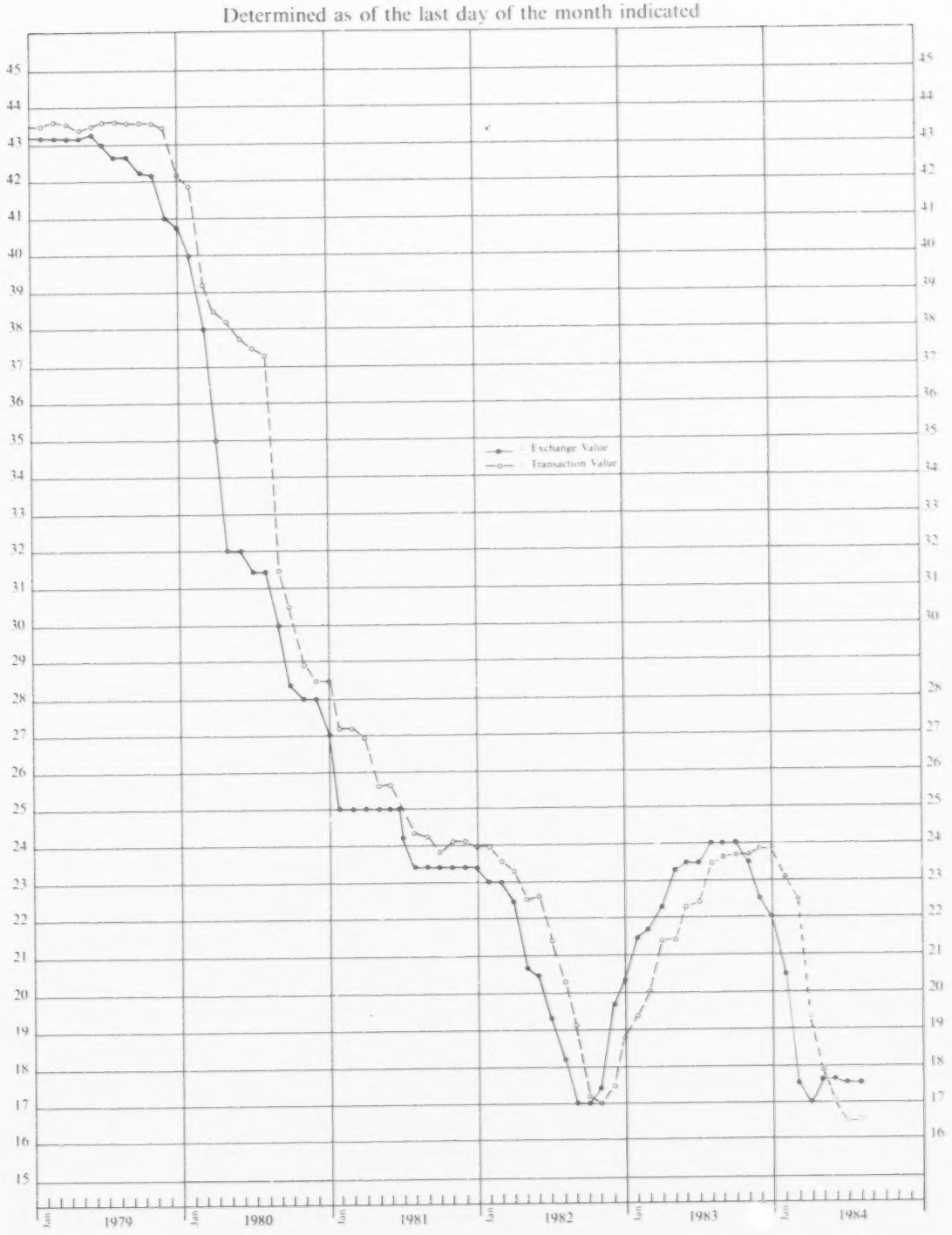
HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES
SINCE JANUARY 1979
Determined as of the last day of the month indicated



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HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	32.50	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	**17.50**					

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	**16.60**					

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	**0.00**					

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GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups[1] (1969=100)	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates[2] (1976=100)
1983 Avg.	401.2	182.4R
Apr 1983	407.3	180.9R
May 1983	414.7	180.9R
Jun 1983	415.6	181.0R
Jul 1983	408.3R	180.7R
Aug 1983	403.0R	180.7R
Sep 1983	402.9R	180.6R
Oct 1983	397.5R	188.3R
Nov 1983	395.5R	188.3R
Dec 1983	399.2R	188.1R
Jan 1984	399.1R	188.3R
Feb 1984	402.3R	188.2R
Mar 1984	403.8R	188.0R
Apr 1984	404.0	195.6R

R = Revised since last month

CANADA

		Wage-earner Data: Average Hourly Earnings (C$)[2]				
	Industry Selling Price Index: Manufacturing[1] (1971=100)	Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Primary Metal Industries Non-ferrous[4] (SIC 296)	(SIC 298)	Chemicals and Chemical Products[5] (SIC 372-379)
1983 Avg.	298.8	—	14.69	14.30	—	—	11.17
Jul 1983	300.4	16.48	14.35	13.93	11.70	9.83	11.04
Aug 1983	301.3	16.93	14.36	13.89	11.82	10.08	11.19
Sep 1983	301.1	17.66	14.90	14.41	11.99	10.32	11.29
Oct 1983	301.6	17.73	15.27	14.65	11.76	10.03	11.30
Nov 1983	301.8	17.82	15.29	14.67	11.78	10.62	11.38
Dec 1983	302.9	17.84	15.11	14.66	11.86	10.60	11.51
Jan 1984	305.4R	17.74	15.27	14.74	11.91	10.84	11.69
Feb 1984	306.6R	17.78	15.59	14.90	12.04	10.82	11.51
Mar 1984	308.9R	18.05	15.52	14.82	12.14	10.84	11.58
Apr 1984	310.4R	18.06	15.83	15.10	11.96	10.34	11.63
May 1984	310.5R	—	15.50P	15.04P	12.10P	10.15P	11.59P
Jun 1984	310.9P	—	—	—	—	—	—

P = Preliminary R = Revised since last month

For annual averages prior to 1983, and for notes pertaining to these statistics, see pages 23-26 of Report 190 of June 1984.

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REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per per Metric Ton of Gold Ore Milled (Rand)[1]	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982=100)[2]	Consumer Price Index[3] (1975=100)[4]	Producer Price Index All Groups[5] (1975=100)	Total Employment in Mining and Quarrying (Code 35)[6]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[6]
1983 Avg.	51.87	115.0	262.2	274.8	696,579	3,644,772
Jul 1983	—	—	262.5	273.7	704,202	314,566
Aug 1983	—	—	265.6	278.9	698,984	311,789
Sep 1983	52.92	117.4	267.3	279.4	696,435	312,264
Oct 1983	—	—	270.0	281.0	693,225	311,418
Nov 1983	—	—	271.4	281.6	688,459	317,485
Dec 1983	53.70	119.6	273.2	283.7	690,750	333,595
Jan 1984	—	—	274.7	283.3	689,807	326,619
Feb 1984	—	—	278.4	286.5	702,553	335,906
Mar 1984	55.30	123.1	281.9	288.0	715,628	342,332
Apr 1984	—	—	286.1	290.2	—	—
May 1984	—	—	288.3	292.6	—	—
Jun 1984	—	—	291.2	—	—	—

UNITED STATES

	Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
	Industrial Commodities (1967=100)	All Commodities (1967=100)	(1967=100)	(1972=100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1983 Avg.	315.8	303.1	298.4	215.63	12.57R	13.43R	10.59R	8.65R
Jun 1983	315.3	302.4	298.1	214.55	12.55R	13.37R	10.52	8.63
Jul 1983	316.5	303.2	299.3	—	12.59R	13.56	10.59R	8.67R
Aug 1983	317.3	304.7	300.3	—	12.54R	13.46	10.62R	8.62R
Sep 1983	317.1	305.3	301.8	216.44	12.62R	13.46R	10.70R	8.73R
Oct 1983	318.5	306.0	302.6	—	12.67R	13.55R	10.79R	8.71R
Nov 1983	318.3	305.5	303.1	—	12.64R	13.56	10.86	8.77R
Dec 1983	318.4	306.1	303.5	218.53	12.75R	13.33R	10.90R	8.84R
Jan 1984	319.1	308.0	305.2	—	12.67	13.38	10.91	8.88
Feb 1984	320.6R	308.9R	306.6	—	12.81	13.34	10.90	8.86
Mar 1984	321.9	311.1	307.3	220.58R	12.85	13.33	10.95	8.88
Apr 1984	322.5	311.4	308.8	—	12.91R	13.30R	10.97	8.89
May 1984	323.3	311.7	309.7	—	12.91P	13.36	10.99R	8.87R
Jun 1984	323.9	311.4	310.7	222.31P	—	—	11.03P	8.89

P = Preliminary R = Revised since last month

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